

OPINION

on a dissertation work for the acquisition of an educational and scientific degree "doctor"

Author of the dissertation: **Gloria Hristova**

Dissertation Topic: **Automated Online Customer Communication Analysis System Using Machine Learning and Natural Language Processing - Structure, Construction, and Business Applications**

Author of the opinion: **prof. Ph.D. Angel Angelov Marchev**

1. Relevance of the problem developed in the dissertation in scientific and scientific-applied terms.

The relevance of the topic is gradually presented in the first chapter, representing the theoretical part. Natural language processing is one of the most difficult and at the same time the most promising topic in research automation, complex analyzes and meta-analyses. Of particular importance to us is the development of algorithms and software libraries that operate well with texts in the Bulgarian language. In this regard, the purpose of the dissertation is appropriately defined and well decomposed into tasks. The author's main thesis is attainable and supported by the necessary preliminary definitions.

It should be especially noted that the dissertation is the result of a partnership with a business organization - the sponsor of the research.

2. Degree of knowledge of the state of the problem and creative interpretation of the literary material.

Used scientific literature is a volume of 220 titles (entirely in English and with a large preponderance of publications from the last 10 years), some of them are classic sources, but the great majority are narrowly specialized and up-to-date scientific articles and studies. The literature review carried out and presented in the theoretical parts of the dissertation show the dissertation student's high awareness of the issues considered in the dissertation, excellent author's interpretation, and easy handling of the relatively complex toolkit.

3. Correspondence of the chosen research methodology and the set goal and tasks of the dissertation with the contributions achieved.

One of the merits of the dissertation is the original implementation of the machine learning methodology for natural language processing and the corresponding structuring of the textual data into originally developed data arrays.

4. Scientific and/or scientific-applied contributions of the dissertation work.

The dissertation presents seven claims for scientific contributions of a scientific-applied nature. I consider the contributions thus presented to be achieved and correctly defined.

I almost completely agree with the formulation of the scientific contributions presented by the doctoral student, and where I have objections, they are more of a technical nature - the first contribution is insufficient in scope to be considered a scientific result - a theoretical contribution, implies the development of a new theory in a comprehensive and systematic view. The main scientific and scientifically applied results are of a methodological nature. Methodological results are in four directions:

- Methodology for interpretation of the obtained results;
- Automation of the process of extracting knowledge from online chat communication (with adaptive capabilities);
- Methodology for predicting customer satisfaction;
- Specific procedures for data processing and analysis .

The applied results are related to the methods created for the specific application for conducting a chat with customers and for performing an analysis of the topics of interest to the customers. Applied contributions are close in meaning and can be combined into one. The authorship of the described results is beyond doubt. The set tasks have been achieved and presented in the dissertation, which actually means that the set goal has been fulfilled.

5. Evaluation of publications on the dissertation work.

The PhD student has presented five independent publications in prestigious publications on the subject. Four of them are in prestigious publications, and the fifth is a conference report. At the moment, the publications are suitable for presenting the essential points of the dissertation, but my recommendation is to publish more essential parts of the methodology and empirical studies.

6. Opinions, recommendations, and notes.

The main remarks to the presented dissertation refer to the introductory part of the dissertation.

First, even after the explanatory note made (on p. 8) that the thesis is also aimed at business readers, I consider it inappropriate that the introduction (which in scientific texts is strictly descriptive) should take on a hybrid appearance similar to the so-called "executive summary" (typically presenting business issues and preliminary conclusions). A scholarly style should be maintained when it comes to a dissertation. I still think that the readability could have been improved if the aim, objectives, scope, object, and subject of the dissertation were set out separately in the introduction, and the rationale (i.e., almost all the rest of the introductory part of the text) was placed in the theoretical part (with a sample title "study setting").

Second, I strongly recommend that the developed program codes be applied - not only is this good modern scientific style, but proof of their development is inevitably another applied contribution. Subsequently, it becomes clear that the program code is the property of the sponsor of the application.

In summary, on the one hand, it is good that there is a partnership with business, but according to the author of the opinion, this should not be at the expense of scientific quality. Of course, this note is of a very general nature and not specifically about the dissertation, but about our budding business partnership practice.

7. Conclusion

In conclusion, I believe that the notes presented are more of a technical nature and do not represent a significant obstacle to a successful public defense for an EST doctor.

The presented dissertation has sufficient merits that give me reason to recommend to the respected Scientific Jury to award an educational and scientific degree "doctor" to Gloria Hristova, in professional direction 3.8. Economics, for the dissertation work on the topic: "Automated system for analyzing online customer communication using machine learning and natural language processing - structure, construction and business applications".

Sofia,
22.08.2022

Signature:
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